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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/004,090	10/23/2001	Michael Kowalchik	EMR-00301	9342

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EXAMINER

CHACE, CHRISTIAN

ART UNIT	PAPER NUMBER
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2187

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DATE MAILED: 11/04/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/004,090

Applicant(s)

KOWALCHIK ET AL.

Examiner

Christian P. Chace

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 October 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-29 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-29 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 October 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Information Disclosure Statement

The Information Disclosure Statement filed 23 October 2001 has been considered by examiner. A signed and initialed copy is attached hereto.

Double Patenting

Copending applications 10/001,317 and 10/004,090 (instant) were found to have obviousness-type provisional double-patenting issues. The instant application was found to have broader claims than 10/001,317.

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 1 and 20 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1 and 23, respectively, of copending Application No. 10/001,317. Although the conflicting claims are not identical, they are not patentably distinct from each other because claim 20 of the instant application anticipates claim 23 of the copending application, and instant

claim 1 is missing one limitation of copending application's claim 1, which is an obvious modification. All of this is explained below in detail.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

With respect to claim 20 of the instant application, please refer to the table below, which illustrates the anticipatory relationship of the claims at issue:

<u>Application 10/001,317</u>	<u>Instant Application 10/004,090</u>
23. A data storage system, comprising:	20. A data storage system, the system comprising:
A back-end storage system	At least one first data storage device
having an address space, addresses in the address space identifying blocks of storage	[inherent: storage systems must have addresses and addresses inherently identify blocks of storage, or storage locations]
	Having a platter size of at least 3.5 inches in diameter
A cache for the back-end storage system	At least one second data storage device
Having a lesser storage capacity than the back-end system	[inherent: definition of a cache, i.e., smaller and faster memory for faster access closer to the processor]
The cache including:	Comprising:
A front-end interface	A device interface
That receives I/O requests	For receiving data access requests
That specify respective addresses of back-end storage blocks	[inherent as discussed supra]
A back-end interface	A second controller
That communicates with the back-end storage system	That coordinates data access to the at least one first data storage device and the at least one second storage device
Cache storage formed by at least two disks having platter diameters less than 3.5 inches	More than two disk drives coupled to the controller, the drivers having platter sizes less than 3.5 inches in diameter
A cache manager that services at least some of the I/O requests received via the front-end interface using blocks temporarily stored in the cache storage	A first controller configured to receive data access requests from the interface

Claim 1 is provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 1 of copending Application No. 10/001,317 in view of Sne et al, US Patent #5,890,207. As will be illustrated below in the table, the instant claim 1 would anticipate copending claim 1, with the exception of the back-end interface that can retrieve data identified by the storage addresses.

<u>Application 10/001,317</u>	<u>Instant Application 10/004,090</u>
1. A cache comprising:	1. A data storage device, the device comprising:
A front-end interface	A device interface
That receives data access requests	For receiving data access requests
That specify respective data storage addresses	[inherent: any storage access request must specify an address, or location, of the data or area it wishes to access]
A back-end interface that can retrieve data identified by the data storage address	[Obvious: see <i>Graham v. Deer</i> factors below]
Cache storage formed by at least two disks	More than two disk drives
Cache manager	A controller
That services at least some of the requests	That accesses the disk drives
Received at the front-end interface	In response to the received data access requests
Using data stored in the cache storage	[inherent: by accessing the disk drives, data stored in the disk drives is "used."]
	[disk drives] having platter sizes less than 3.5 inches in diameter

However, Sne et al disclose that back-end interfaces are used to connect a cache, or global memory, to a disk array, in the abstract.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention, having the instant application and Sne et al before him/her, to have a back-end interface, or disk adapter, to move data between the cache, or global memory and disk drives, as discussed by Sne et al in column 2, lines 55-56, for example.

This is a provisional obviousness-type double patenting rejection.

Specification

The attempt to incorporate subject matter into this application by reference to another copending patent application is improper because the serial number of said application is not included (see page 1 and page 10 of the instant specification).

The use of the trademark, "Infiniband," has been noted in this application. It should be capitalized wherever it appears and be accompanied by the generic terminology. Although it is accompanied by other "protocols," applicants do not discuss what kind of protocols they are, *i.e.*, protocols for what?

Although the use of trademarks is permissible in patent applications, the proprietary nature of the marks should be respected and every effort made to prevent their use in any manner which might adversely affect their validity as trademarks.

The following claims are objected to because of the following informalities:

Claim 15, in line 3, recites, "a least two of the drives." Examiner has interpreted this to be, "at least two of the disk drives." This has not been made a 35 USC 112, 2nd paragraph rejection as there are no other "drives" claimed that create a rejection situation. However, even though examiner understands that these are the "disk drives"

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of the instant claim 1, upon which the instant claim depends, applicants should amend the language to be specifically consistent throughout the claims to avoid any confusion as the general public reads the claims, should they pass to issue. Claims 5, 16, 17, 19, 20, and 23 contain a similar oversight.

Also, claims 2 and 25 recite "the interface," which, for the same reasons discussed supra, be "the device interface."

In claim 12, "strip" should be "stripe."

In addition, claims 13 and 14 discuss a cache manager. However, no cache is ever claimed. Although examiner understands that this is probably "the data storage device," the general public may or may not understand that fact if these claims are passed to issue – it could be potentially misleading, as a data storage device is much broader in scope than a cache. Therefore, applicants, would, in effect, be either limiting the scope of their claims to a cache (as opposed to a data storage device), or be facing a 35 USC 101 rejection as a cache manager must have a cache to manage, or the system is rendered inoperable.

Appropriate correction is required.

The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

The following title is suggested: "Disk Based Disk Cache Interfacing System and Method."

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-7 and 10-29 are rejected under 35 U.S.C. 102(b) as being anticipated by Brant et al (US Patent #5,805,787).

With respect to independent claim 1, a data storage device is disclosed in figure 1, #16.

A device interface for receiving data access requests is disclosed in figure 1 as #11.

More than two disk drives are disclosed in figure 1 as #22. Those disk drives having platter sizes less than 3.5 inches in diameter is disclosed in column 3, lines 44-46. A controller that accesses the disk drives in response to the received data access requests is disclosed in figure 1 as #20, and it's operation is further discussed in column 6, line 35, for example.

With respect to claims 2 and 25, the [device] interface comprising and interface configured to conform to a protocol is disclosed in column 6, lines 39-44, where the protocol is "SCSI-type connections."

With respect to claims 3 and 26, the protocol comprising at least one of the following: SCSI, Fibre Channel, and "Infiniband" is disclosed in column 6, lines 39-44, which specifically discloses SCSI.

With respect to claims 4 and 27, the platter sizes comprising at least one of the following platter sizes: 2.5 inches, 1.8 inches, and 1 inch in diameter is disclosed in column 3, lines 44-46, which not only discloses the 1.8 inch diameter disk, but also states that "(or smaller)" [would work in the invention]. "Or smaller" would include the 1 inch diameter as well.

With respect to claims 5, 17, and 23, at least one of the drives comprising an IDE drive is disclosed in column 6, lines 22-24.

With respect to claims 6 and 22, the more than two disk drives having platter sizes less than 3.5 inches in diameter comprising more than two disk drives having platter sizes 2.5 inches or less in diameter is disclosed in column 3, lines 44-46, which not only discloses the 1.8 inch diameter disk, but also states that "(or smaller)" [would work in the invention]. "Or smaller" would include the 1 inch diameter as well.

With respect to claim 7, the more than two disk drives having platter sizes less than 3.5 inches in diameter comprising more than two disk drives having platter sizes one inch in diameter or less is disclosed in column 3, lines 44-46, which not only discloses the 1.8 inch diameter disk, but also states that "(or smaller)" [would work in the invention]. "Or smaller" would include the 1 inch diameter and smaller as well.

With respect to claims 10, 21, and 28, the controller comprising a controller configured to implement or access the more than two disks in, a RAID scheme is disclosed in column 5, lines 34, 36, and 44, in general. RAID stands for, "Redundant Array of Independent Disks." In this case, column 5, line 59 recites "Controller 20 can include independent paths to write data to its memory in a mirrored fashion." Mirroring

is redundant storage of data. The cache being an array is disclosed in column 4, line 15, for example. Figure 1 clearly shows separate disks, and, therefore, independent disks. Therefore, RAID is explicitly disclosed embodied in the invention of Brant et al.

With respect to claims 11 and 29, the scheme implemented by the controller comprising a RAID scheme is disclosed as discussed supra with respect to instant claims 10, 21, and 28. The RAID scheme being independent of a hierarchically higher RAID controller that sends the data storage device data is discussed in column 5, lines 12-35. By stating that the system of Brant et al, which includes RAID, as discussed in the cited passage, that the storage subsystem can fill several intermediate slots in the hierarchy, as stated in line 31 of the instant passage, Brant et al anticipates hierarchically higher RAID controllers.

With respect to claim 12, the RAID data comprising at least one of a strip[e], an error detection code, and an error correction code, is disclosed in column 3, lines 11-12 and 19-20, where reconstruction based on parity is error correction, and parity comparisons are error detection. Striping is used in RAID applications, which are discussed in column 5, lines 34, 36, and 44, for example.

With respect to claim 13, the data storage device further comprising a cache manager is disclosed in figure 1 as #20, and it's operation is further discussed in column 6, line 35, for example.

With respect to claim 14, the cache manager comprising a manager configured to perform at least one of the following: translate an address of a different storage device (for example, back-end storage), cache data included in a write request, load

data from the different storage device, and remove cached data is disclosed in column 6, line 35, for example. The controller #20 in Brant et al performs the functions of the instantly claimed cache manager as well as the instantly claimed controller of instant claim 1.

However, it happens that all of the following are anticipated by the cited prior art of record, with the instant claim limitations in parenthesis along with the relevant citation in Brant et al:

Requesting data from a back-end storage system (which inherently requires translating the address of that different storage system) (see column 6, lines 50-51);

Retrieving requested data (caching data included in a write request and loading data from the different storage device) from the [at least two] disks [making up the cache] (see column 4, lines 9-19);

Sending data to the back-end system for writing (column 6, lines 50-51);

Determining the location of back-end system data (more address translation) within the [at least two] disks [making up the cache] (column 4, lines 32-48).

Removing data from the [at least two] disks [making up the cache] (removing cached data) (column 4, lines 42-44).

With respect to claim 15, a controller card that includes the controller and connections available to couple with more than one storage card that provides access to the [a] the [at] least two of the [disk] drives is disclosed in column 5, lines 41-45, which discloses ASIC based daughter cards which the disclosed products of Brant et al can be based on. These products of Brant et al are what examiner is rejecting the

instant claims over, so it logically follows that "these products" apply to the instant claim language.

With respect to claim 16, the storage card comprising a card having at least one parallel interface to a collection of the drives is disclosed column 5, line 30 as well as lines 41-45, for the reasons as discussed supra with respect to claim 15.

With respect to claim 18, the connection between the controller and storage card comprising a serial connection is disclosed in column 6, line 41, as "SCSI-type connections." SCSI has a serial as well as a parallel "type" connection, and, therefore, the cited passage anticipates the instant claim language.

With respect to claim 19, the controller comprising a bank interface that routes data requests to the appropriate bank of drives is disclosed in figure 1 as #15, as discussed in column 5, lines 54-56, for example.

With respect to independent claim 20, a data storage system is disclosed in figure 1.

At least one first data storage device is disclosed in figure 1 as #25. The storage device having a platter size of at least 3.5 inches in diameter is disclosed in column 5, line 39. The hierarchy listed in column 5, from line 12 to line 28, shows the lower levels of the hierarchy having higher capacity disks. To increase capacity on a disk that uses a standard method of data storage, one must, inherently, increase the physical size, or platter size, of that disk.

At least one second data storage device is disclosed in figure 1 as #16.

A device interface for receiving data access requests is disclosed in figure 1 as #11.

A first controller configured to receive data access requests from the [device] interface is disclosed in figure 1 as #20.

More than two disk drives coupled to the controller are disclosed in figure 1 as #22, coupled by #15. The [disk] drives having platter sizes less than 3.5 inches in diameter is disclosed in column 3, line 45, for example.

A second controller that coordinates access to the at least one first storage device and the at least one second storage device is disclosed in figure 1 as #24.

With respect to independent claim 24, a method of servicing data access requests at a data storage device is disclosed in column 2, lines 46-53, for example.

Receiving data access requests at a device interface is discussed in column 6, lines 39-44, for example. The host sends and receives data through interface #11 in figure 1.

Accessing more than two disk drives (figure 1, #22) having platter sizes less than 3.5 inches in diameter (column 3, line 45) in response to the received data access requests is disclosed in column 6, lines 39-48.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 8 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Brant et al as applied to claim 1, upon which the instant claims depend, above, and further in view of Eckerd et al (US Patent #6,078,498).

Brant et al teaches the data storage device as claimed in claim 1 of the instant application, and also teaches smaller form factor disk drives in column 1, line 42, for example.

The difference between Brant et al and the instant claims are the explicit recitations of a housing, the housing having one of the following form factors: standard, half-height, and low-profile.

However, Eckerd et al disclose a top cover cooperating with the base deck to form an internal, sealed environment for the disc drive in column 3, lines 22-25. This is a housing. In column 6, lines 18-30, Eckerd et al disclose that housing to be a standardized form factor, including low profile, nominal, and half-height.

Therefore, it would have been obvious to one of ordinary skill in the art, at the time of the invention, having the teachings of Brant et al and Eckerd et al before him/her, to utilize the housing and form factors of Eckerd et al in the invention of Brant et al, because smaller form factor disk drives permit disk subsystems to exploit

performance advantages of having more disks to service requests in parallel, as discussed by Brant et al in column 1, lines 42-45, and because the relative configurations of the mounting plate and chassis can vary depending upon requirements of a given application, as discussed in column 5, lines 15-18 of Eckerd et al.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

US Patent #5,805,787 – Cited and discussed supra with respect to the claims

US Patent #5,933,853 – Multi-level cache hierarchy including a cache HDD

US Patent #6,101,576 – Disk cache

US Patent #6,389,510 – Disk cache in an internet environment

US Patent #5,911,779 – Copy-back disk cache

US Patent #5,787,466 – Multi-tier cache and method of implementing

US Patent #5,754,888 – Cache disk destaging

US Patent #5,721,956 – Network cache disk with multiple hierarchy

US Patent #5,890,207 – Same as instant invention, except that the cache is not at least two disks

US Patent #6,078,498 – Disk drive housing and form factors

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christian P. Chace whose telephone number is 703.306.5903. The examiner can normally be reached on 9-4-5.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Donald Sparks can be reached on 703.308.1756. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703.305.3900.

A handwritten signature in black ink, appearing to read 'C. P. Chace', with a stylized flourish at the end.

Christian P. Chace